

VIBRATION AND RESONANCE BEHAVIOR OF
BACK-TO-BACK STIRLING-CYCLE CRYOCOOLERS

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Vibration generated by small Stirling-cycle cryocoolers is an important concern for spacecraft instrument planning to incorporate these cryocoolers for near-term space-science missions. JPL has an extensive ongoing cryocooler characterization program addressed to measuring important performance characteristics such as self-generated vibration and investigating means of improving cryocooler performance.

The self-generated vibration and resonant frequencies have been measured for a variety of Stirling cryocoolers, from early engineering development model coolers to prototype coolers. Back-to-back coolers and coolers with vibration cancellation electronics are emphasized in this paper to provide insight on cryocooler vibration sensitivity to cooler operating parameters such as stroke or drive frequency as well as harmonic cancellation of the vibration levels in the axial and lateral directions.

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